Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Unlicensed Operation in the TV Broadcast Bands	)	**ET Docket No. 04-186**
	)	
Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band	)	**ET Docket No. 02-380**

To: The Commission

COMMENTS OF THE NATIONAL TRANSLATOR ASSOCIATION

NATIONAL TRANSLATOR ASSOCIATION

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November 30, 2004

The National Translator Association ("NTA"), submits its comments in the above-referenced proceeding. The NTA represents the interests of owners and operators of translator stations throughout the country. Many of these translators are owned and operated by community groups, towns, counties, and states on a nonprofit basis as the only way local, free, over-the-air television can be provided in rural areas. Many translator stations are also owned by the nation's television stations and provide a free over-the-air television service to rural and outlying areas from the main stations.

Translator stations are authorized by the FCC to fill a very important need, especially in rural areas. Both distance and terrain block television reception. In general, these stations receive the signal of a full-service television station and rebroadcast that signal for direct reception by the public. The need for continued translator service is especially evident in rural areas, where translator stations are the primary source of over-the-air television. The over-the-air signal of an over-the-air television station is the primary source of emergency information and quality of life information available to rural America, a need not fulfilled by satellite television with its limited local channel offerings.

The NTA commissioned a study by Decisionmark Corporation of Cedar Rapids, Iowa, that examined the reliance of the general public on translator stations to receive over-the-air television service. (A copy of this study is attached as Exhibit 1, and hereinafter will be referred to as "the Study.") The Study looked at the over-the-air television coverage of ABC, CBS, NBC, FOX, UPN, WB, and PBS. The Study clearly demonstrates that a significant number of American households can only receive the major networks over the air through translator stations. More specifically, over one

Comment:

million five hundred thousand households only receive CBS, NBC, and ABC over the air from a translator station. For PBS this number increases to two million three hundred thousand households, and for FOX over two million one hundred thousand households. Lesser, but also significant, numbers of households receive UPN and WB signals over the air, but only because of the Commission's unwillingness or inability to make available sufficient spectrum for translator stations. By inspection of the maps accompanying the Study, it can be seen that the principal source of over-the-air television in rural portions of the United States is by means of translator station service.

As the attached engineering statement demonstrates so clearly, while the NTA has significant problems with other aspects of the rulemaking, the principal problem is the failure of the proposed rule to protect television reception out to the limits of practical and useful reception. Proposed Rule Section 15.244(g) proposes to avoid interference to television stations on the basis of the latters' contours. As the Commission has recognized in Section 73.683 of the Rules, however, those protected contours do not in fact represent the true coverage of a television station. This becomes a more pronounced problem in rural areas and in areas of mountainous terrain where the only source of over-the-air television would be a translator station that could be located many miles from the reception point. If the other problems noted by the NTA and the other commenters are resolved by the Commission, then the Commission should not proceed until it can protect over-the-air television stations to their actual established reception patterns.

The Commission recognizes that the more accurate method of determining actual viewing is set forth in OET Bulletin 69. The attached Decisionmark study was prepared using the procedures set forth in OET 69. To now establish a mechanism, as proposed in

the instant proceeding, that would limit the television stations' interference-free reception to their FCC-protected contours would be to deprive millions of viewers in rural areas of the opportunity to receive free over-the-air television.

Translator stations were first authorized in 1956.[1] The Commission at that time specifically declined to state that they were secondary services because of the recognized importance of using these stations to bring television to rural areas:

> Translators are intended primarily to provide a means whereby television can be brought to areas without service. Translators could also be employed to bring multiple services to communities too small to support several stations on a regular basis. We recognize that the use of translators in competition with regular stations raises a number of serious questions. Nevertheless, we do not agree that a universal, hard and fast rule governing such situations should be adopted at this time.[2]

Later, the Commission determined that translators would be secondary services, but only to allow flexibility in allocating full-service stations to replace them with no loss of television service.

The potential loss of service from translator stations with the adoption of the instant Rule as proposed will have the same effect as that which the Commission faced in clearing the Channel 52-69 bands for other uses. The Commission's plan for the orderly transition to digital television required that, first, television broadcast stations would be moved out of the 60-69 channel band, and that there would be adequate room to accommodate most of the full-service television stations and most of the translator stations either in the core or on Channels 52-59. In fact, many translator stations were moved to Channels 52-59 in order to continue service.

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[1] Authorization of Television Translator Stations, Report and Order in Docket No. 11611, FCC 56-446, 13 Rad. Reg. (P&F) 1561, 1566 (1956).

[2] Id. at 1566.

The transition has not, in fact, happened as the Commission had originally planned. Although certain channels in the 60-69 band were auctioned because of the need for public service spectrum, it turns out that the first channels to be auctioned for other commercial use would be channels 54, 55, and 59. Because translator stations were moved into the 52-59 channel block, there is a very high concentration in that block of translators, many of which would be affected by the implementation of new uses for Channels 54, 55, and 59.

When Congress acted to amend the Communications Act of 1934, as amended, through the Auction Reform Act of 2002 to delay the spectrum auctions until a time arrived that was more conducive to an orderly transition to digital television, that time to be picked by the FCC, it did so with the express concern that there would be no degradation or loss of television service as a result of efforts by the Commission to clear Channels 52-69 for other commercial users until the transition to digital television was complete (*see* Section 6, Commission not to take any action that will "result in any degradation in, or loss of service, or an increased level of interference to any television household") and the stations could be accommodated. Congress's clear concern was that there be no loss of television service to American households as a result of the digital transition.

As pointed out by the NTA and many other commenters, there are significant shortcomings to the instant proposal. The NTA sets forth a number of those issues in its attached engineering statements (Exhibit 2), and the engineering statement is adopted as part of the NTA's comments. The NTA strongly believes that people living in rural America should be afforded the same benefits of modern society as people living in urban

areas. However, those benefits cannot be provided as a trade-off. The public interest requires that the Commission protect the actual reception of over-the-air television signals in rural America.

Respectfully submitted,

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November 30, 2004

ENGINEERING STATEMENT IN SUPPORT OF THE RESPONSE
OF THE NATIONAL TRANSLATOR ASSOCIATION TO THE
NOTICE OF PROPOSED RULEMAKING IN ET DOCKET NO. 04-186,
"UNLICENSED OPERATION IN THE TV BROADCAST BANDS"

Introduction

The concept of making a large amount of spectrum available for "new and innovative types of unlicensed devices and services" free of the hassle associated with performing an interference analysis and obtaining a license has great intuitive appeal. The problem is the necessity of devising a workable plan for avoiding interference to any TV broadcast signal throughout the area where that signal is used.

The proposed rules place reliance on the establishment of databases specific to an area, and would require a portable device to receive a control and enabling signal.
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Protection of TV Reception

The most serious problem with the proposed rules is their failure to protect TV reception out to the limits of practical and useful reception. See proposed §15.244(g) which tabulates the protected contour values... It is proposed to protect the various classes of TV stations within their "Protected Contours" which are calculated on the basis of their height above the average terrain from 2 to 10 miles and the appropriate F50/50 statistical propagation curve. However, it is well known that the protected contours are not a reliable method of determining where a given station will place a useful signal[1].

The proposed protected contour values assume that only locations with signal strengths at least equal to the protected contour value for the several classes of stations need to be protected. In rural areas where the public is making the best of fringe area signals outside antennas are the norm. Fringe area antennas will make a watchable picture from field strengths that are considerably below the Grade B values for full service stations. A safety margin is required as outlined below.

In developing the "Table of Allotments for Digital Television Stations" the Commission recognized the inadequacy of the protected contours and created a more sophisticated and accurate method of interference analysis which has come to be known as the "Longley-Rice Terrain Dependent Analysis" and is described in the Office of Engineering and Technology Bulletin 69. The computer program which implements this procedure calculates the signal strength of a protected station in individual cells, and

[1] §73.683 states in relevant part: "These [contours] are specified as Grade A and Grade B and indicate the approximate extent of coverage over average terrain in the absence of interference from other television stations. Under actual conditions the true coverage may vary greatly from these estimates because the terrain over any specific path is expected to be different from the average terrain on which the field strength charts were based.

determines which have a useable signal strength. It then calculates the interference to these cells before a new station is added and eliminates from further consideration those with interference. A new facility must not cause a protected station to lose more than a certain per cent of its covered population. The allowable per cent depends on type of protected station.

Attached coverage plots show the variation between the F50/50 protected contours and the Longley-Rice predicted coverage for a high band VHF translator and a UHF translator. It is readily apparent that the protected contour cannot be relied upon as a means of determining where the viewing public should be protected from interference from an unlicensed intentional radiator.

Recommendation:

If the Commission determines to proceed with this hazardous venture the determination of vacant channels and their useable areas should be based on an extension of the established OET Bulletin 69 procedure. This methodology for determining the field strength in cells is well developed. Only minor augmentations of the existing FCC interference analysis program would be needed to allow a determination of the interference free signal strength in each cell. This can be used to build the database of unused channels cell by cell. The customary cell size is 2 kilometers square but can be smaller if the organization creating the database desires more precise results. The only downside to smaller cells is more computing time and a larger resulting database.

As noted above in fringe areas the public will derive watchable pictures from signal strengths considerably below the full service protected values. In order to be certain that no service is lost by the public, cells should be protected from new interference if their Longley-Rice field strength is at least:

Low band VHF - 37 dBµ
High band VHF - 46 dBµ
UHF band - 54 dBµ (with dipole adjustment factor)[2]

Equipment and Installation - Fixed Operation

Location By Use Of GPS Signals

It is proposed to require a fixed intentional radiator to have the capability of receiving GPS signals with a high degree of precision. Such radiators that operate on TV

[2]See Office of Engineering and Technology Bulletin 69 for an explanation of “dipole adjustment factor”.

channels 22-24 and 32-38 will need stringent suppression of second and/or third harmonics to avoid self-interference to the reception of GPS signals[3]

Channel Availability Database for Fixed Operations:
The proposed rules offer two options:

> "The intentional radiator shall have capability of accessing a database and computational software to determine the TV channels that are vacant at its location"

or

> "The unlicensed device or its operator must periodically access a channel availability database and computational software to ensure that the channels on which the device operates remain unused."[4]

As protection of the public's TV reception must be the top priority, keeping the information on which the fixed intentional radiator selects channels accurate and up to date must be a top priority.

Recommendation:
If the process is automatic such as relying on a transmitted database the updating should be continuous. The maintenance routine for the equipment should include a documented procedure, approved as part of the initial certification, which allows a frequent check of the accurate functioning of the automatic facilities.. It is recommended that this maintenance check be required at intervals no longer than a month and that the results be kept in a maintenance log.

If the process is done manually by the operator, it is this writer's opinion that it should be performed no less frequently than once a day.

Identification:
The proposed rules include a requirement that "Devices operating under the provisions of this section shall be equipped with a means to automatically and periodically transmit a unique identification signal".[5]

TV and FM translators have been required since their inception to transmit an identification in Morse code at 30 minute intervals. This is generally done by frequency shift keying for TV translators and AM modulation of the carrier for FM translators. The transmitted identification has proven to be completely useless because it would take special equipment to hear the code plus a person capable of reading code. When the

[3]See the extensive discussion of the need to protect GPS receivers from harmonics of TV transmitters operating on channels where the second or third harmonics fall in the GPS bands in the Report and Order in MB docket 03-185, FCC 04-220 at ¶220-221.

[4]§15.244(e)(1) &(2), NPRM Pg. 28

[5]§15.244(k), NPRM Pg. 30

need arises to locate a translator it will be found by other means. Usually their location is a matter of local knowledge, but in exceptional cases the location might be accomplished by means of triangulation i.e. taking bearings with a receiving antenna oriented to the source from two or more locations.

It seems unlikely that a transmitted identification would be any more useful in locating a fixed "Unlicensed Radiator". Its location would more likely be found by triangulation.

A second part of the problem is finding the organization or person responsible for the operation.[6] To allow the easiest and most certain identification two requirements should be included in the rules:

1) A minimal application to the FCC should be required specifying the location, responsible organization or person, and contact person with address and telephone number. Information to determine whether the supporting structure is registered and if not how it meets the requirements of Part 17[7] would also seem to be required. The problem of keeping contact records up to date is well known, but it is non-the-less important that it be done. It is the writer's opinion that the operator should confirm the contact information on file with the FCC at intervals no greater than once a year.

2) Contact information should be required to be posted at the site at in a manner accessible to and readable by the public.

Security of Equipment:

The proposed rules contain a provision to the effect that only a professional installer can have access to the controls and/or the software that governs the channel selection and power output[8]. The device must not operate if tampering is detected.

It is only necessary to think back to the experience with Citizens Band radios to see that there is trouble here. In their heyday CB stations with output powers 10 to 100 times the authorized limit were common. Even today equipment to defeat the billing mechanism for pay-per-view cable channels is commonly offered on the Internet.

It is simply unrealistic to think there will not be aftermarket accessories that will allow unscrupulous operators, both fixed and portable, to exceed the power limit and to defeat the channel protection mechanisms. A person who holds a valuable license from the

[6] It is all too easy to imagine a scenario where interference is occurring and the source is traced to a locked unlabeled building at a communications site. It is frequently hard to find who has overall responsibility for a communications site and thus tracing the interference to the site leads to a dead end in the absence of posted information.

[7] FCC Rules Part 17: Construction, Marking and Lighting of Antenna Structures

[8] §15.244(k), NPRM Pg. 30

FCC will think twice before operating a station significantly at variance with the rules and the terms of that license. A party that has no nexus with the FCC is much less likely to voluntarily honor the rules. This is a strong argument for requiring at least a minimum license for the communications devices under discussion here.

Impact On The Transition To Digital Television

The public and the TV service industry will be engaged in a steep learning curve as all concerned become familiar with the practical aspects of digital TV reception. Unlike analog TV a digital TV set which receives interference above the "cliff" value does not display the interference but simply ceases to perform (freezes, pixelates or goes blank). Any new source of interference will cause a loss of the TV program for no reason apparent to the viewer and confusion will result. The NPRM acknowledges the "Cliff Effect" which is a characteristic of digital television.[9] The end result will be a loss of confidence in the viability of digital TV by the public.

While the DTV signal is quite robust when it is strong strong and well above the background noise, at fringe area locations where the signal is marginal it is much less able to resist interference. This is illustrated by the downward progression of the allowed ratio of an analog interfering signal as the digital signal becomes weaker. If the digital signal has a signal to noise ratio of 25 dB or better it can withstand an interfering analog signal only 2 dB weaker, but if the digital signal to noise ratio is 16 dB (just above the limit for reception) then the threshold for destructive interference from an analog signal is 21 dB below the digital signal[10].

Thus a DTV signal in a fringe area is very vulnerable to interference. The cause will be hard to identify by service technicians who are still in the learning phase and who will likely come to the conclusion that digital TV does not work reliably.

Recommendation:
The protection mechanisms proposed in this NPRM are not foolproof. There is a significant likelihood that the widespread use of unlicensed "intentional radiators" in rural areas will cause hard to identify interference and inhibit the acceptance of digital TV in those areas. Thus it would seem more prudent to get digital television fully accepted by the public and the service and installation organizations up to speed before introducing this complication.

Problems Associated with TV Translator and LPTV Station Protected Areas:
The NPRM proposes to protect TV Translator and LPTV stations only out to their designated protected contour[11] and would totally fail to protect those viewers that

[9] NPRM, ¶15 at end (Pg. 8)

[10] FCC Rules, §74..706(d)(1)

[11] §15.244(g), NPRM Pg. 28-29.

regularly view signals from these sources in areas outside this contour. In the first place the use of contours derived from FCC F50/50 curves is not a reliable method of determining where a useable signal is present and secondly protecting only to the high field strength value in the tabulation would disenfranchise a large percentage of the viewers of these stations. Particularly in the case of TV translators these signals are often the only available free over-the-air TV.

There can be no justification for disenfranchising viewers of these stations. To be sure they are designated as having secondary status, but from the very inception of translators this has meant that they must not cause interference to primary TV stations and nothing more.

The majority of translators serve rural areas and more often than not viewers have to do what is necessary to receive then or do without. External antennas are the norm and as a result signal strengths even below the full service Grade B values provide useful reception. In these circumstances useful reception can be obtained with UHF field strengths as low as 54 dBµ.

If rural America is not to be disenfranchised it is essential that locations with field strengths at or above the following values be protected:

Low Band VHF: 37 dBµ, High Band VHF: 46 dBµ, UHF: 54 dBµ

In addition translators are frequently located outside the protected area of their primary station but the input signal must be protected or all those dependent on the translator will loose reception. The input signals for translators are derived in several ways:

1) Direct off-the-air reception from the primary station, in which case the primary stations signal must be protected at the translator site.

2) From another translator closer to the primary station, in which case the output frequency of the first translator must be protected at the second location where it is used as the input.

3) Microwave or satellite delivered, in which case protection from ”Intentional Radiators” is not an issue.

The final rules must provide that “Intentional Radiators” not operate on a TV channel used as a translator input in the vicinity of the translator receiving antenna or in a corridor stretching back towards the signal source without coordination between the fixed intentional radiator operator and the translator licensee.

The FCC will need to add the actual input channels for translators to the CDBS records, but it would be desirable to have this information more readily available anyway.

Translators were first mandated to use only channels 70 to 83[12]. Then channels 70 to 83 were removed from the TV band and UHF translators were allowed only on channels 55 to 69. Now channels 52 to 69 are being reassigned and many translators must change channel again. This is a cumulative loss of 192 MHz. We submit that TV translators have been treated in a cavalier fashion by the FCC over and over again. We trust that they will not be stepped on once more as the result of this NPRM. With 192 MHz of spectrum recovered we feel that the FCC should be able to find some non-broadcast spectrum in which to put "Unlicensed Radiators" eliminating the probability of adversely affecting the public which gets its free over-the-air TV via translators.

Conclusions

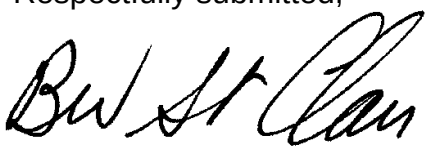
Implementation of the plan to allow unlicensed radiators on vacant TV channels prior to the time digital television is totally accepted by the public will inhibit the transition.

The plan requires the use of untried strategies such as creating and maintaining a database of vacant channels area by area, transmitting this database or otherwise making it readily available and designing equipment that is truly tamperproof. The feasibility of meeting these requirements should be established by field tests with actual hardware and software before authorizing the use of "Intentional Radiators" on vacant TV channels.

TV channel transmissions must be protected throughout the entire area where they actually provide service.

I am a communications engineer and have been engaged in manufacturing translators, planning and constructing translator installations, identifying interference and providing coverage studies almost from the first authorized translators in 1956. The statements in this document are based on my experience and are true and correct to the best of my knowledge and belief.

Respectfully submitted,



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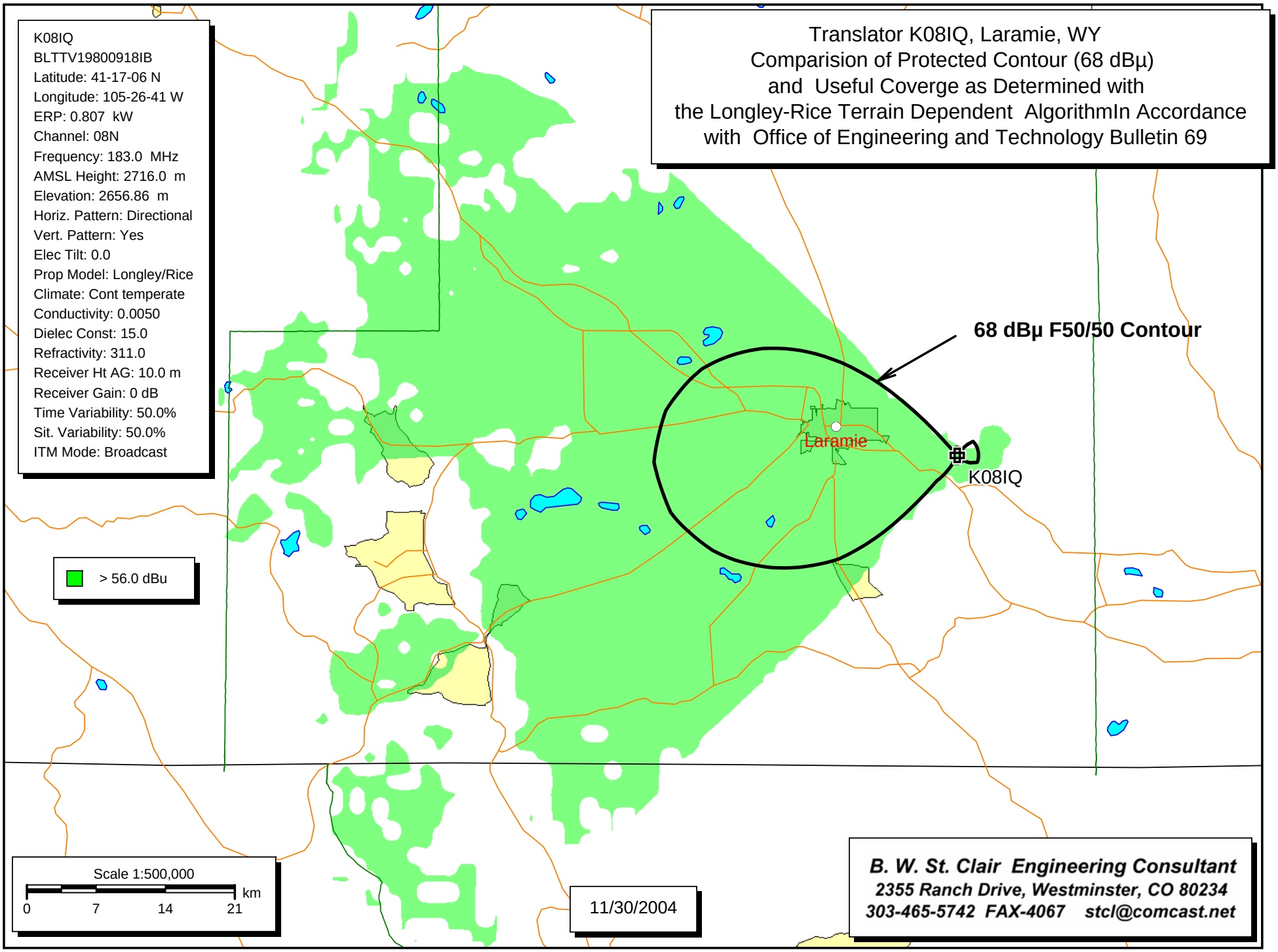
November 30, 2004

[12]The VHF channels were made available a few years later.


K08IQ
BLTTV19800918IB
Latitude: 41-17-06 N
Longitude: 105-26-41 W
ERP: 0.807 kW
Channel: 08N
Frequency: 183.0 MHz
AMSL Height: 2716.0 m
Elevation: 2656.86 m
Horiz. Pattern: Directional
Vert. Pattern: Yes
Elec Tilt: 0.0
Prop Model: Longley/Rice
Climate: Cont temperate
Conductivity: 0.0050
Dielec Const: 15.0
Refractivity: 311.0
Receiver Ht AG: 10.0 m
Receiver Gain: 0 dB
Time Variability: 50.0%
Sit. Variability: 50.0%
ITM Mode: Broadcast
Translator K08IQ, Laramie, WY
Comparision of Protected Contour (68 dBµ)
and Useful Coverge as Determined with
the Longley-Rice Terrain Dependent AlgorithmIn Accordance
with Office of Engineering and Technology Bulletin 69
68 dBµ F50/50 Contour
Laramie
K08IQ
> 56.0 dBu
Scale 1:500,000
0 7 14 21 km
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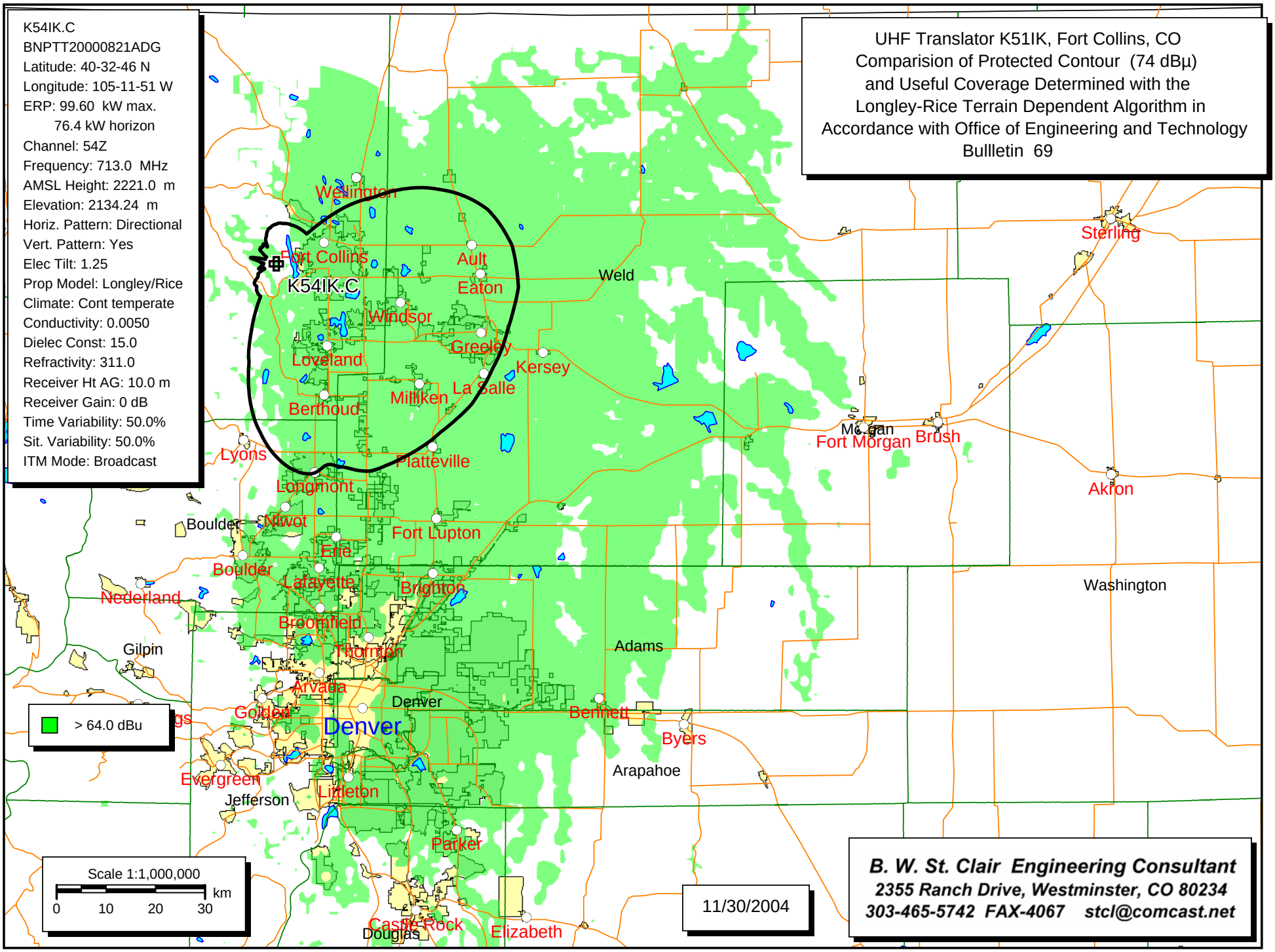
K54IK.C
BNPTT20000821ADG
Latitude: 40-32-46 N
Longitude: 105-11-51 W
ERP: 99.60 kW max.
76.4 kW horizon
Channel: 54Z
Frequency: 713.0 MHz
AMSL Height: 2221.0 m
Elevation: 2134.24 m
Horiz. Pattern: Directional
Vert. Pattern: Yes
Elec Tilt: 1.25
Prop Model: Longley/Rice
Climate: Cont temperate
Conductivity: 0.0050
Dielec Const: 15.0
Refractivity: 311.0
Receiver Ht AG: 10.0 m
Receiver Gain: 0 dB
Time Variability: 50.0%
Sit. Variability: 50.0%
ITM Mode: Broadcast
UHF Translator K51IK, Fort Collins, CO
Comparision of Protected Contour (74 dBμ)
and Useful Coverage Determined with the
Longley-Rice Terrain Dependent Algorithm in
Accordance with Office of Engineering and Technology
Bullletin 69
Wellington
Fort Collins
K54IK.C
Ault
Eaton
Windsor
Greeley
Loveland
Kersey
La Salle
Milliken
Berthoud
Lyons
Platteville
Longmont
Niwot
Boulder
Fort Lupton
Erie
Boulder
Lafayette
Brighton
Nederland
Broomfield
Thornton
Gilpin
Adams
Arvada
Denver
Golden
Denver
Bennett
Byers
Arapahoe
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Littleton
Parker
Douglas
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Sterling
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Households Served/Unserved Tower Analysis

Presented to the National Translator Association
January 2002
by

decisionmark™

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Household Served/Unserved Tower Analysis Introduction

This study illustrates the total number of households served and unserved by stations' predicted Grade B signals for the following networks: ABC; CBS; NBC; Fox; WB; PBS; and UPN. This report is all inclusive of the entire United States.

Seven maps, one for each network, represent the total number of households served and seven additional maps demonstrate the total number of households served exclusively via translator support.

Grade B household demographic coverage due to translator coverage only is provided. The study also provides the projected number of households that can and cannot receive all seven network signals.

Decisionmark Methodology

ILLR Algorithm — Signal strength is determined by using the Individual Location Longley Rice Algorithm as defined in the FCC Report and Order, FCC99-14 of February 1, 1999. All processing is performed using Longley-Rice statistical inputs of 50% time variability, 50% location variability and 50% confidence factor for desired signal.

Coronado Data Warehouse — One of the most important components of Decisionmark's technology is our proprietary data warehouse, Coronado. Coronado has become the de facto broadcast industry standard for signal area data. Coronado's TV engineering database includes affiliate information that started with the Federal Communications Commission public domain information, but has been audited and enhanced extensively. It is the most accurate signal area database available and Decisionmark is committed to keeping it up-to-date.

Using the most recent version of Coronado at the time of the requested study (corver20020115), Decisionmark determined the count of served/unserved households by summing 2000 census block group data for each network.

Household Coverage — In the case of the National Coverage, the reports reflect unique households per network. For example, when a household is covered by multiple stations in the same network, the household is only counted once for that network.

In the case of the Translator Coverage, the same concept is used as the National Coverage. All translators being the universe, a household covered by multiple translators in the same network is counted as one household in the translator report.

Considering the above methodology, adding national served households with national served translator households will not reflect the exact households served for a particular network due to potential overlap between main stations and their translators.

Demographics — Decisionmark determines the demographics associated with each station's tower by running the Census Bureau's block group centroids (latitudes and longitudes representing the center of the block group) through the ILLR Server in a point-to-point mode using data from Decisionmark's proprietary Coronado data warehouse. This mode determines the field strength of each latitude and longitude in the form of a dBu. These latitudes and longitudes are then correlated back to the demographics of the Census block group that they represent to get the 2000 total household counts.

Terminology

Network – Television Network

2000 Served Households – Unique household count for block groups in a Network's Coverage Area.

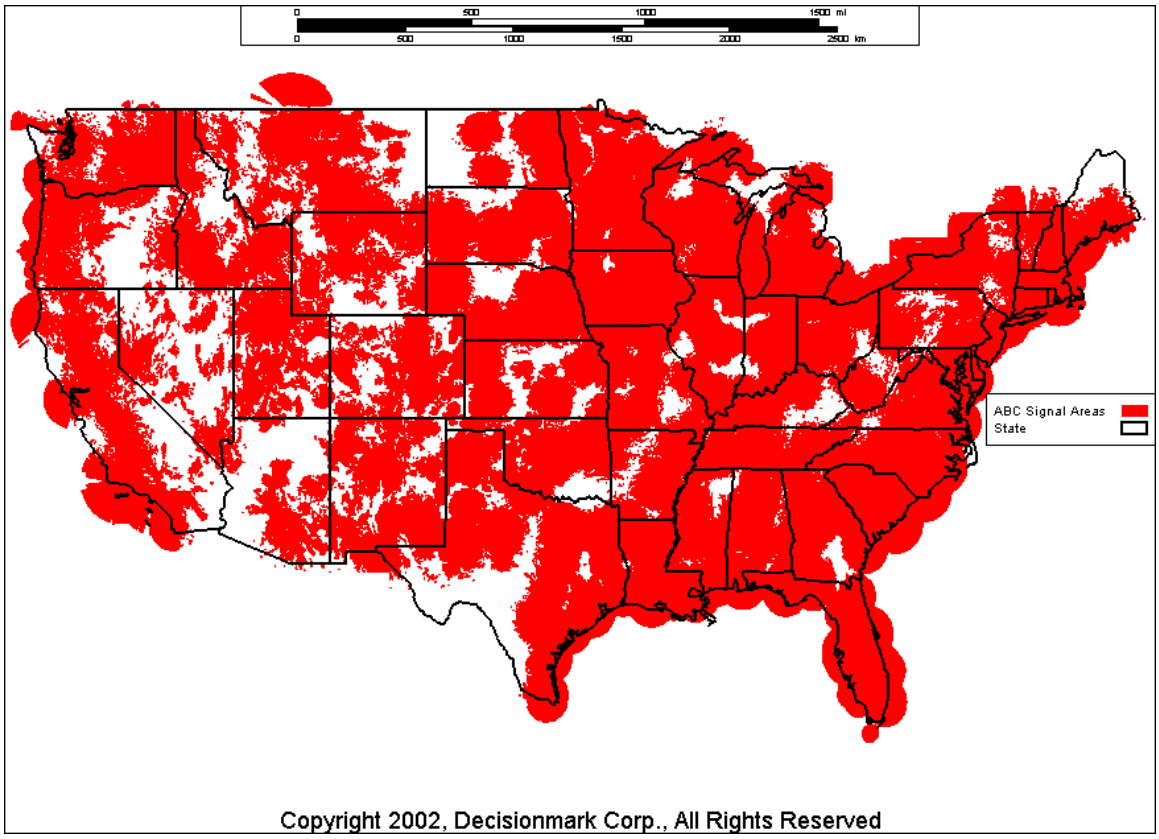
2000 Unserved Households – Unique household count for block groups outside a Network's Coverage Area.

Total – Sum of 2000 Served and Unserved households. Represents total household count for United States.

2000 HHs Can Receive All 7 – Unique count of households that can receive all 7 Network signals.

2000 HHs Cannot Receive All 7 – Unique count of households that cannot receive all 7 Network signals.

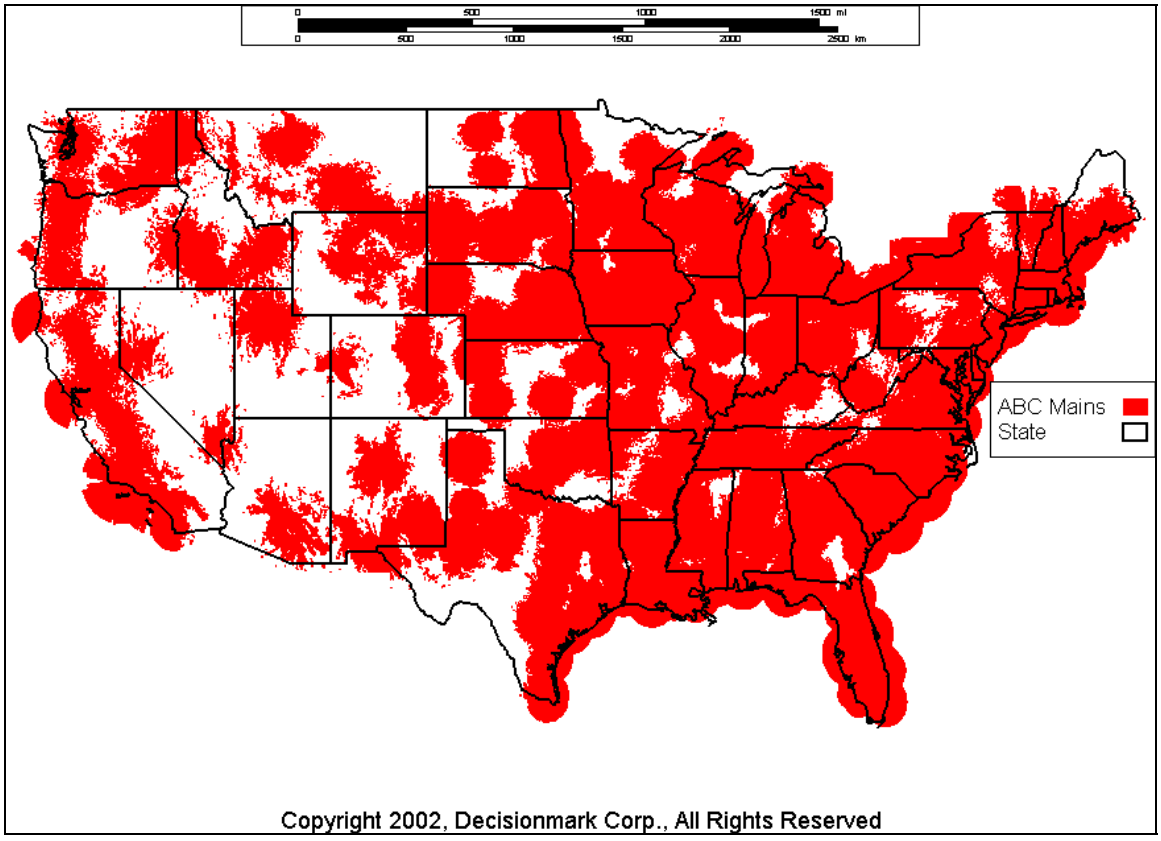
National Coverage for ABC
Mains and Translators



Served/Unserved HHs for ABC

Network	2000 Served Households	2000 Unserved Households	Total
ABC	97,266,475	8,213,626	105,480,101

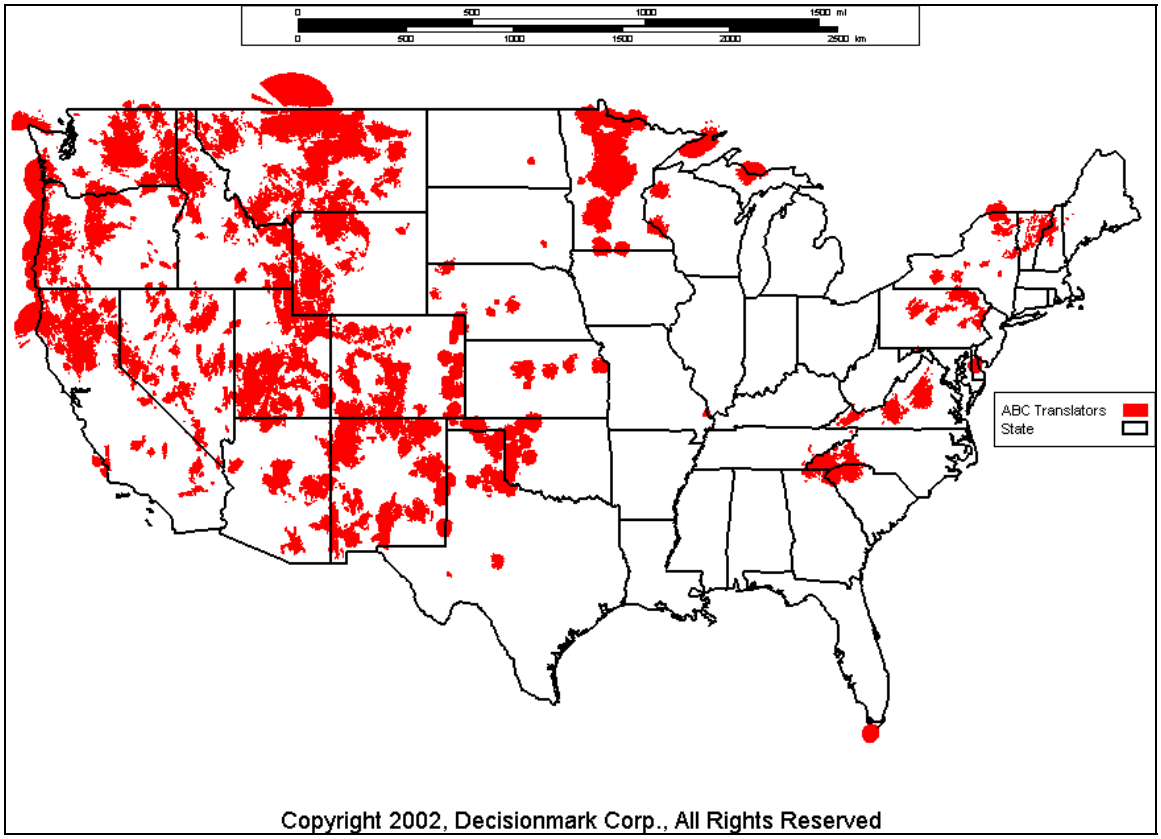
National Coverage for ABC
Mains Only



Served/Unserved HHs for ABC (Mains Only)

Network	2000 Served Households	2000 Unserved Households	Total
ABC	95,765,528	9,714,573	105,480,101

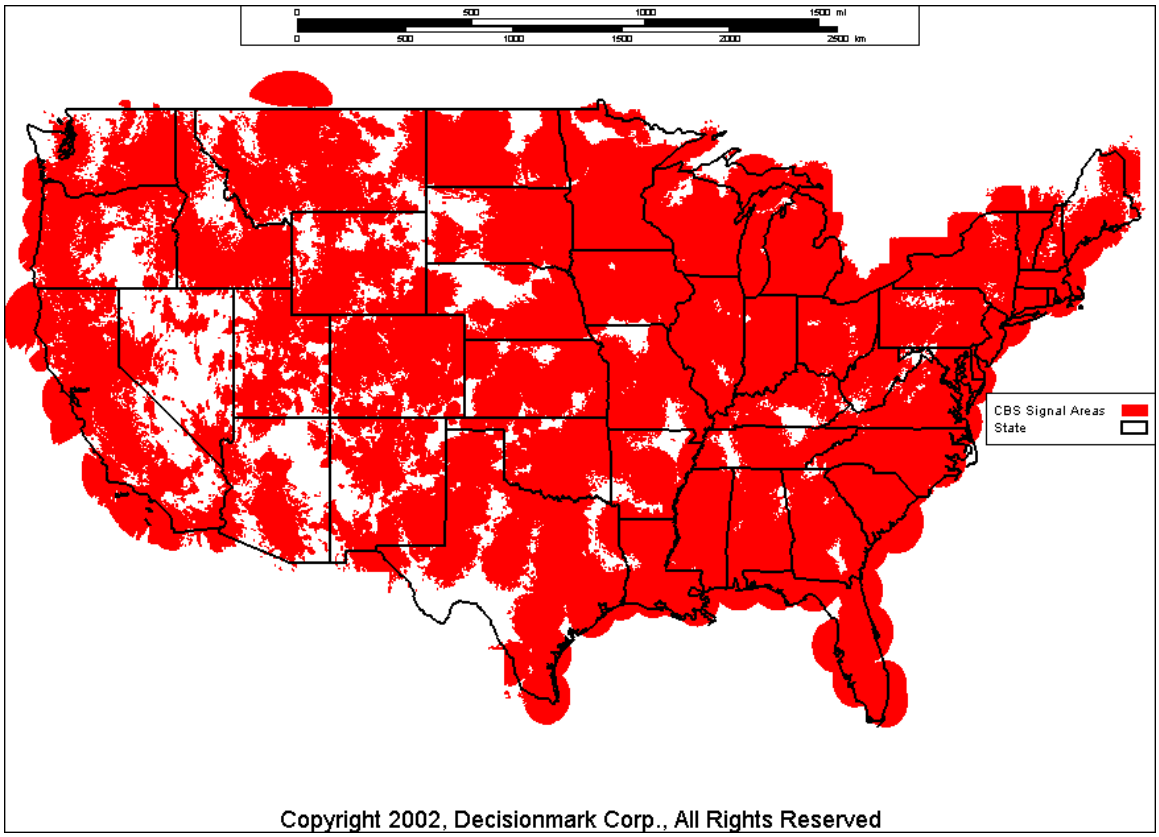
National Coverage for ABC
Translators Only



Served/Unserved HHs for ABC (Translators Only)

Network	2000 Served Households	2000 Unserved Households	Total
ABC	3,825,141	101,654,960	105,480,101

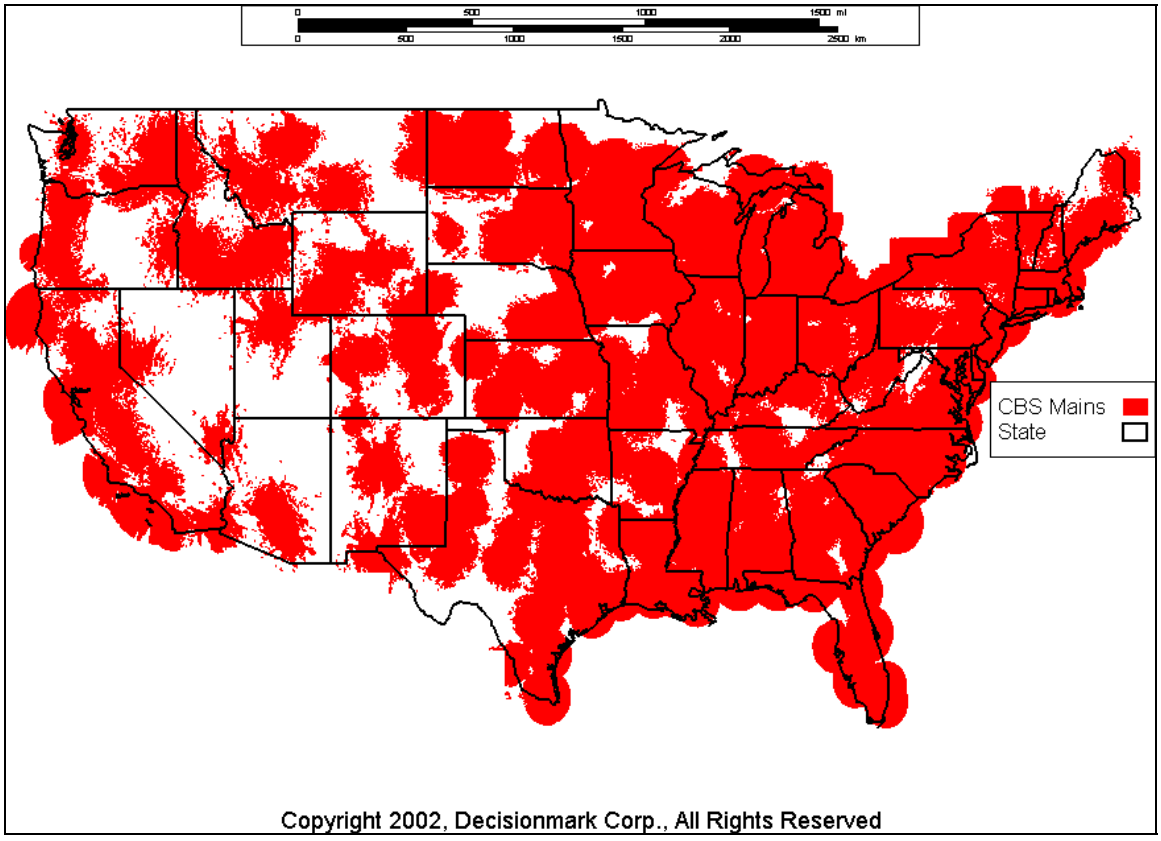
National Coverage for CBS
Mains and Translators



Served/Unserved HHs for CBS

Network	2000 Served Households	2000 Unserved Households	Total
CBS	97,389,064	8,091,037	105,480,101

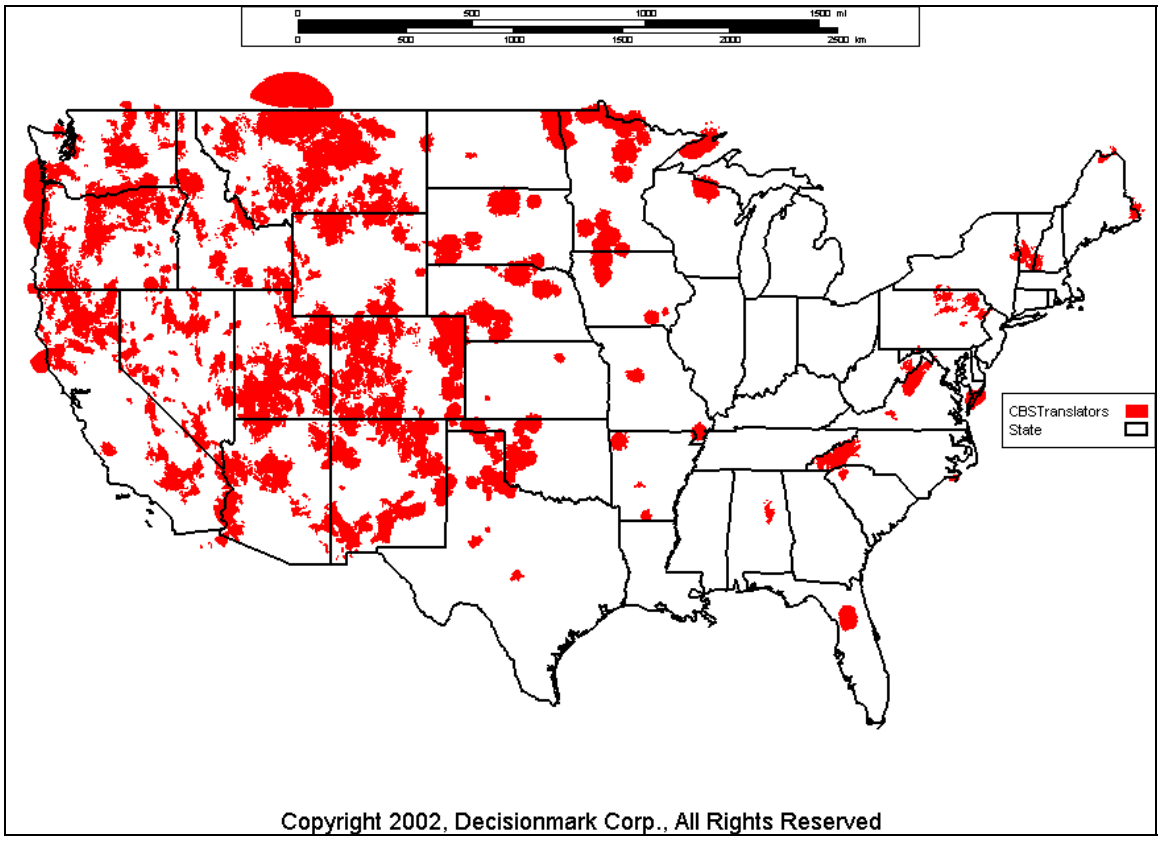
National Coverage for CBS
Mains Only



Served/Unserved HHs for CBS (Mains Only)

Network	2000 Served Households	2000 Unserved Households	Total
CBS	95,871,296	9,608,805	105,480,101

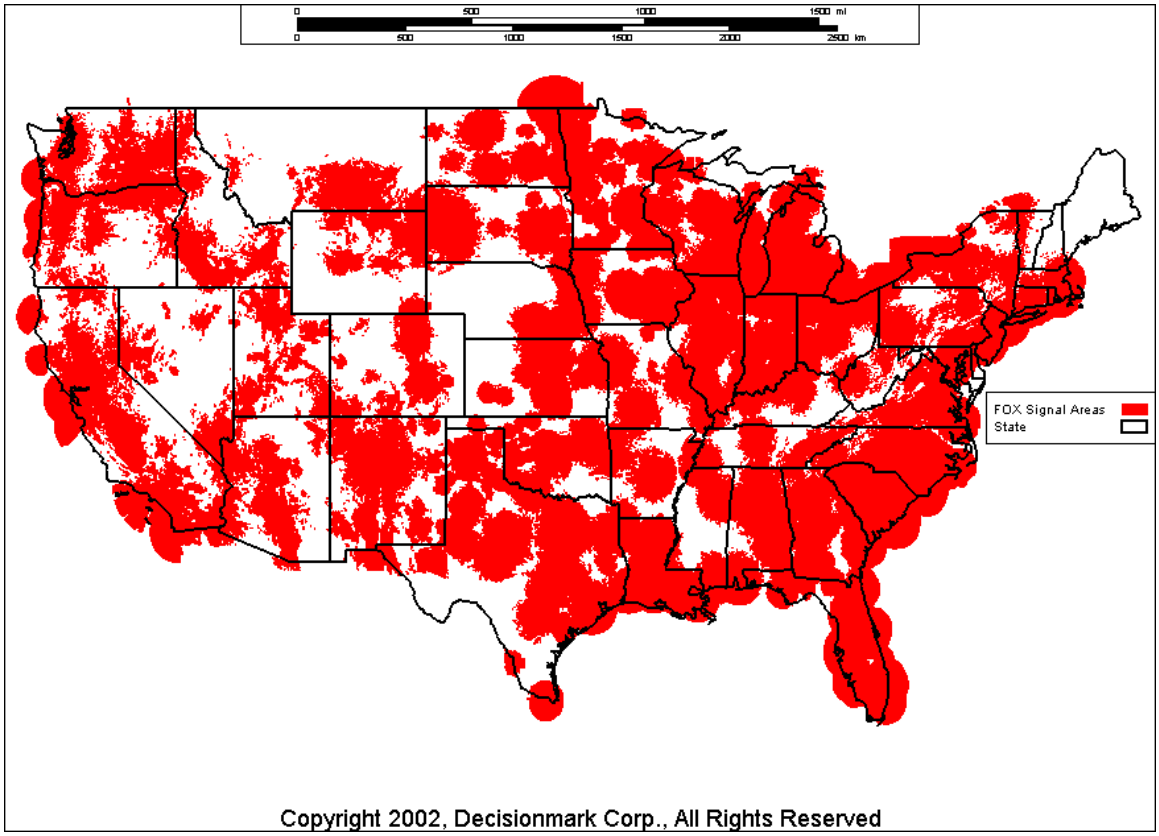
National Coverage for CBS
Translators Only



Served/Unserved HHs for CBS (Translators Only)

Network	2000 Served HHs	2000 Unserved HHs	Total
CBS	3,635,437	101,844,664	105,480,101

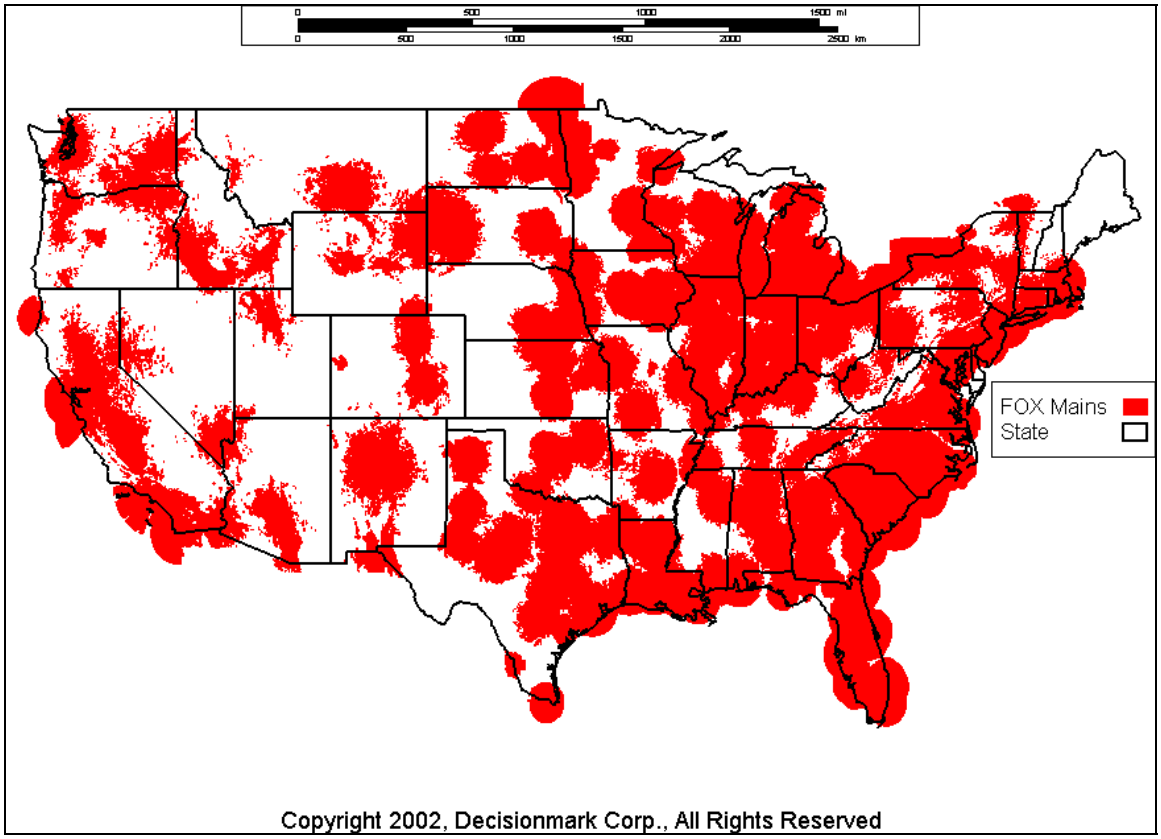
National Coverage for FOX
Mains and Translators



Served/Unserved HHs for FOX

Network	2000 Served Households	2000 Unserved Households	Total
FOX	92,287,920	13,192,181	105,480,101

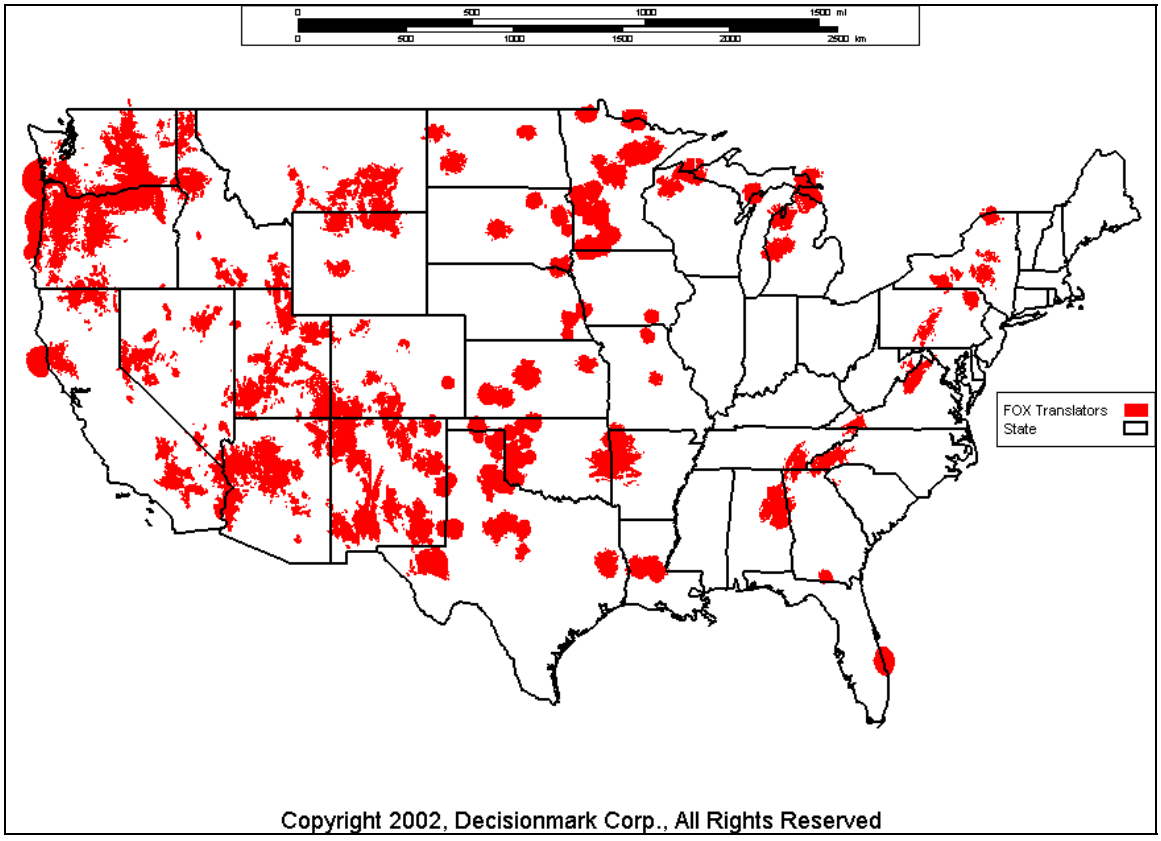
National Coverage for FOX
Mains Only



Served/Unserved HHs for FOX (Mains Only)

Network	2000 Served Households	2000 Unserved Households	Total
FOX	90,136,560	15,343,541	105,480,101

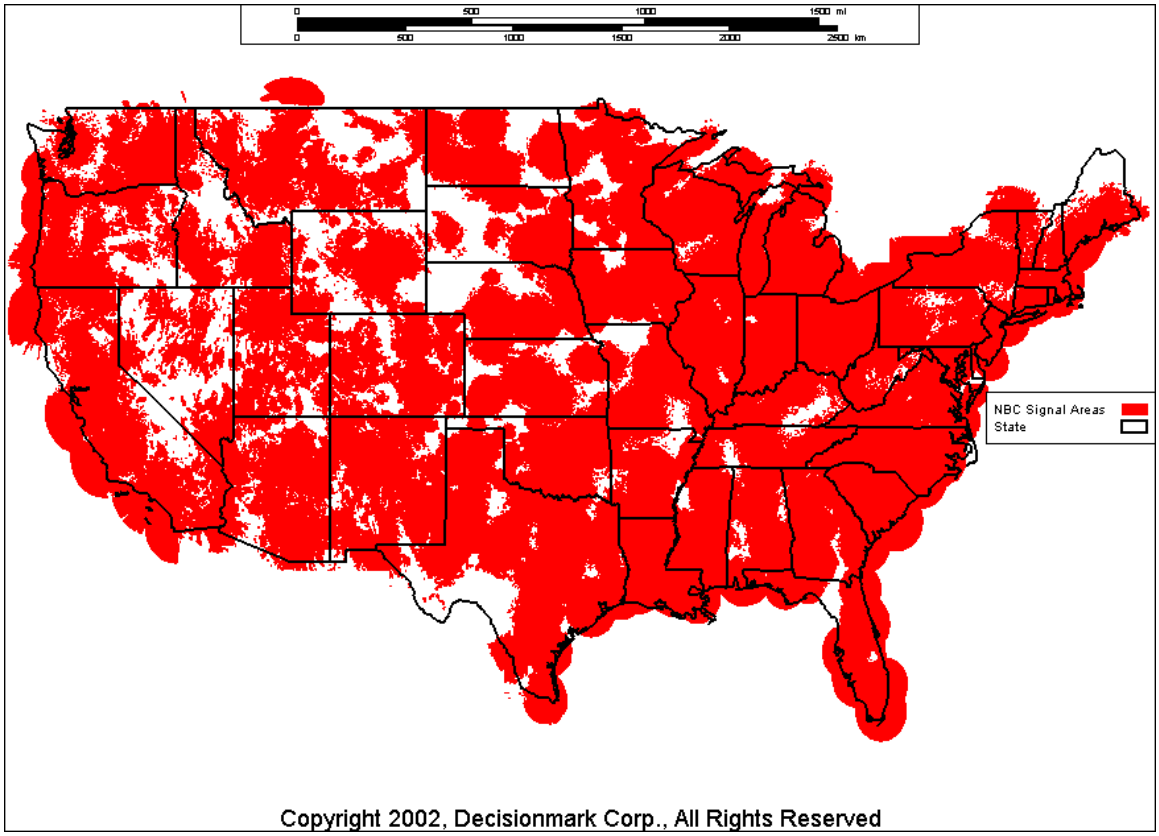
National Coverage for FOX
Translators Only



Served/Unserved HHs for FOX (Translators Only)

Network	2000 Served Households	2000 Unserved Households	Total
FOX	5,096,186	100,383,915	105,480,101

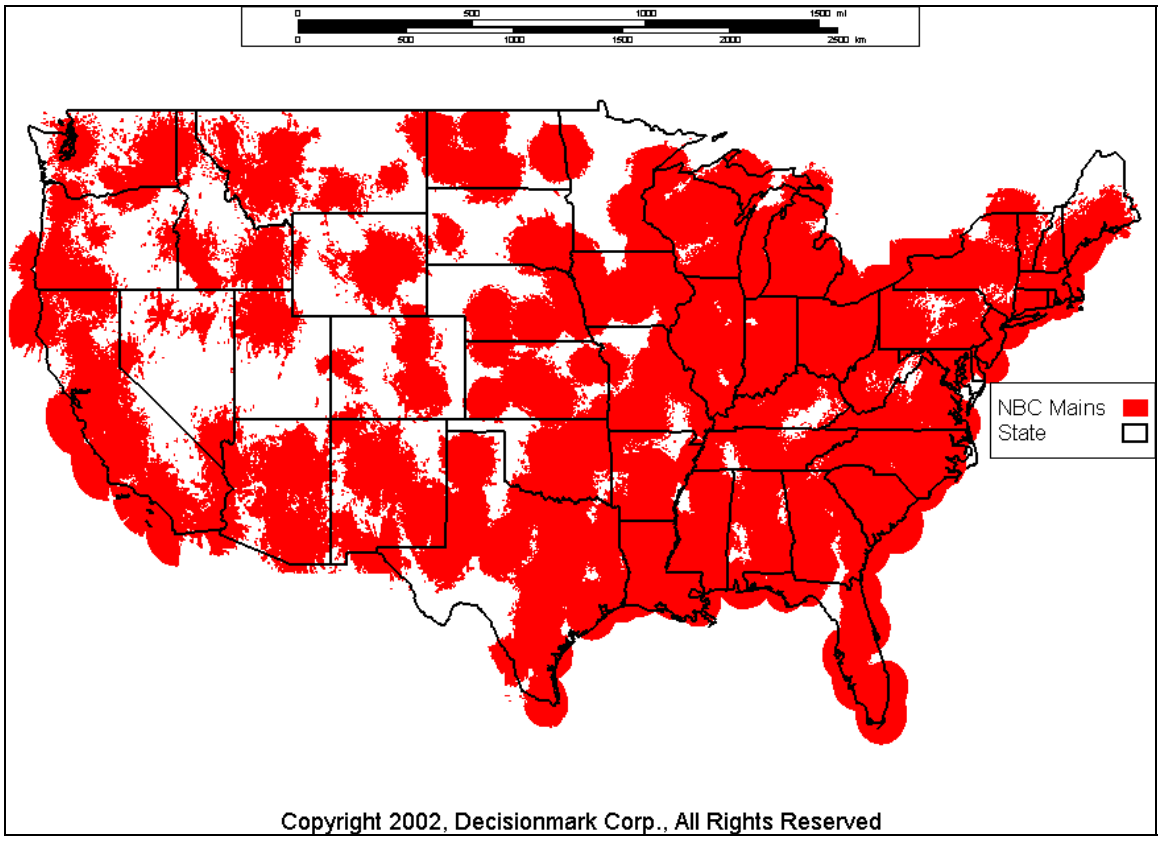
National Coverage for NBC
Mains and Translators



Served/Unserved HHs for NBC

Network	2000 Served Households	2000 Unserved Households	Total
NBC	98,882,479	6,597,622	105,480,101

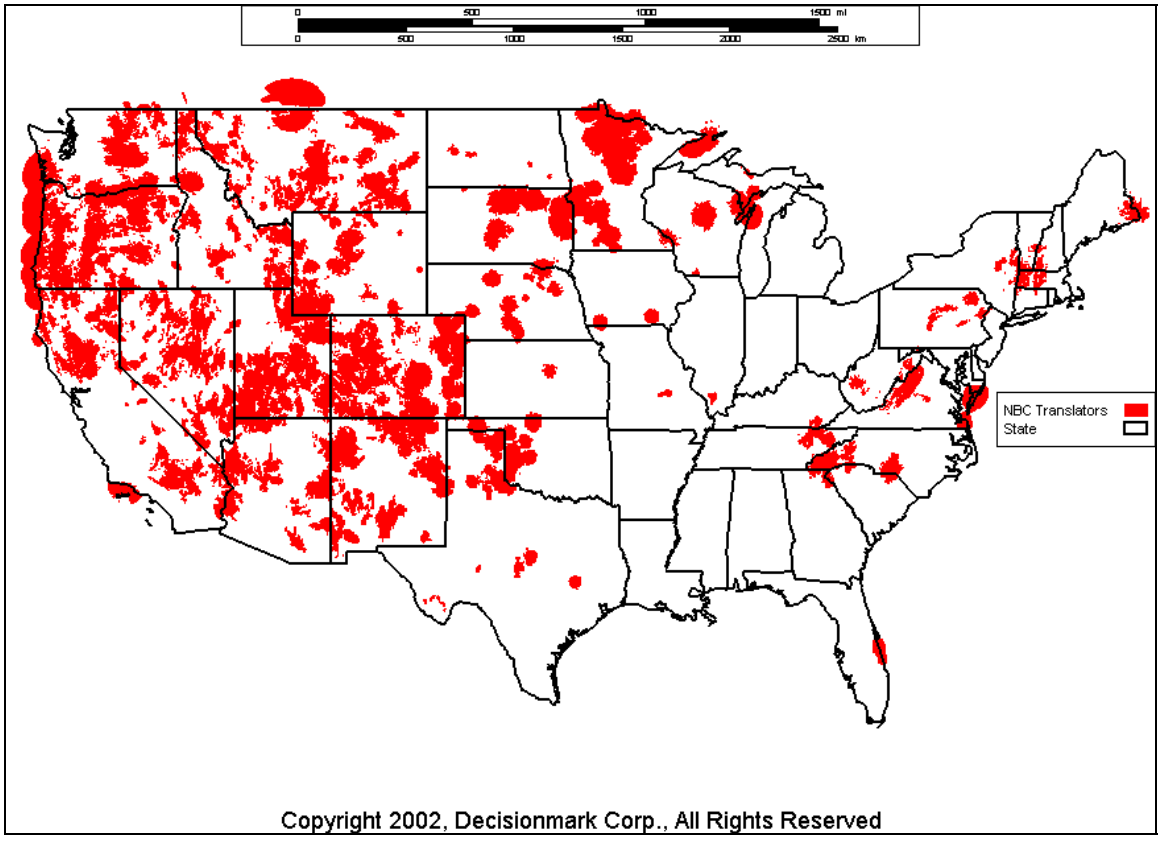
National Coverage for NBC
Mains Only



Served/Unserved HHs for NBC (Mains Only)

Network	2000 Served Households	2000 Unserved Households	Total
NBC	97,337,551	8,142,550	105,480,101

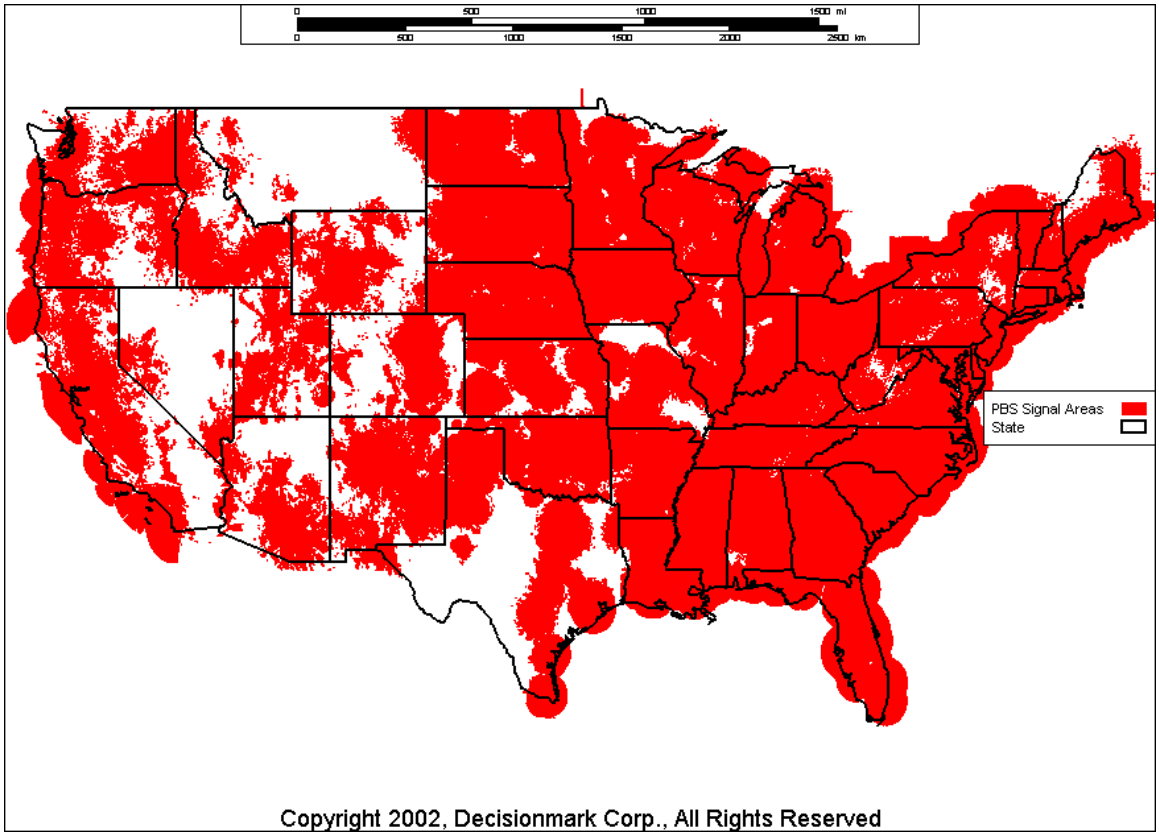
National Coverage for NBC
Translators Only



Served/Unserved HHs for NBC (Translators Only)

Network	2000 Served HHs	2000 Unserved HHs	Total
NBC	4,217,861	101,262,240	105,480,101

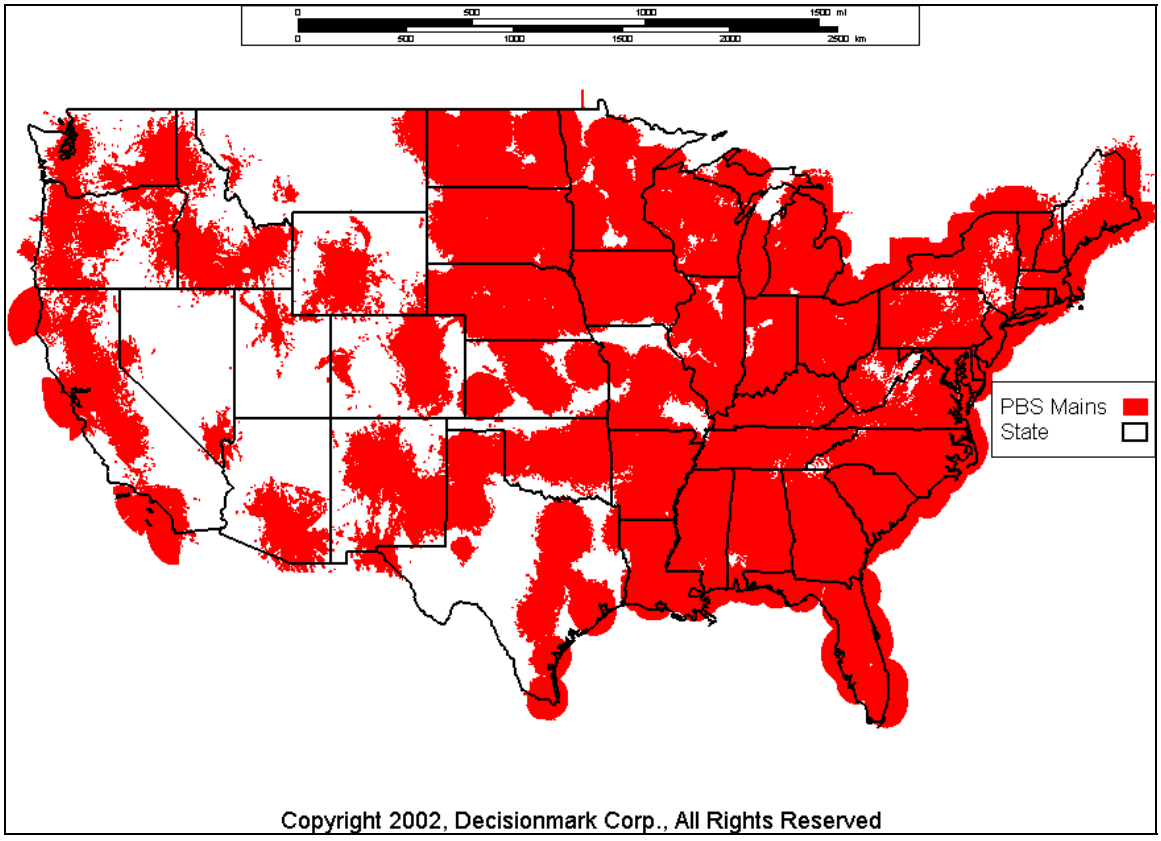
National Coverage for PBS
Mains and Translators



Served/Unserved HHs for PBS

Network	2000 Served Households	2000 Unserved Households	Total
PBS	97,083,278	8,396,823	105,480,101

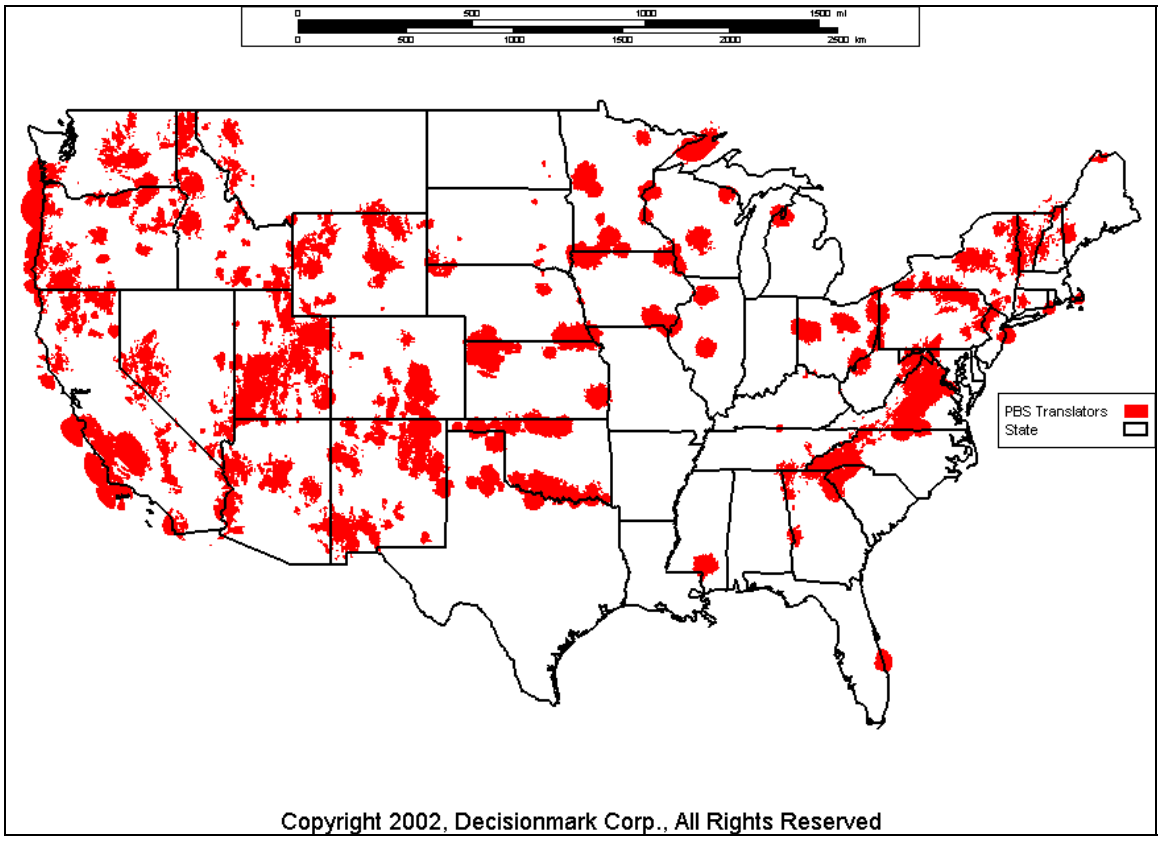
National Coverage for PBS
Mains Only



Served/Unserved HHs for PBS (Mains Only)

Network	2000 Served Households	2000 Unserved Households	Total
PBS	94,769,839	10,710,262	105,480,101

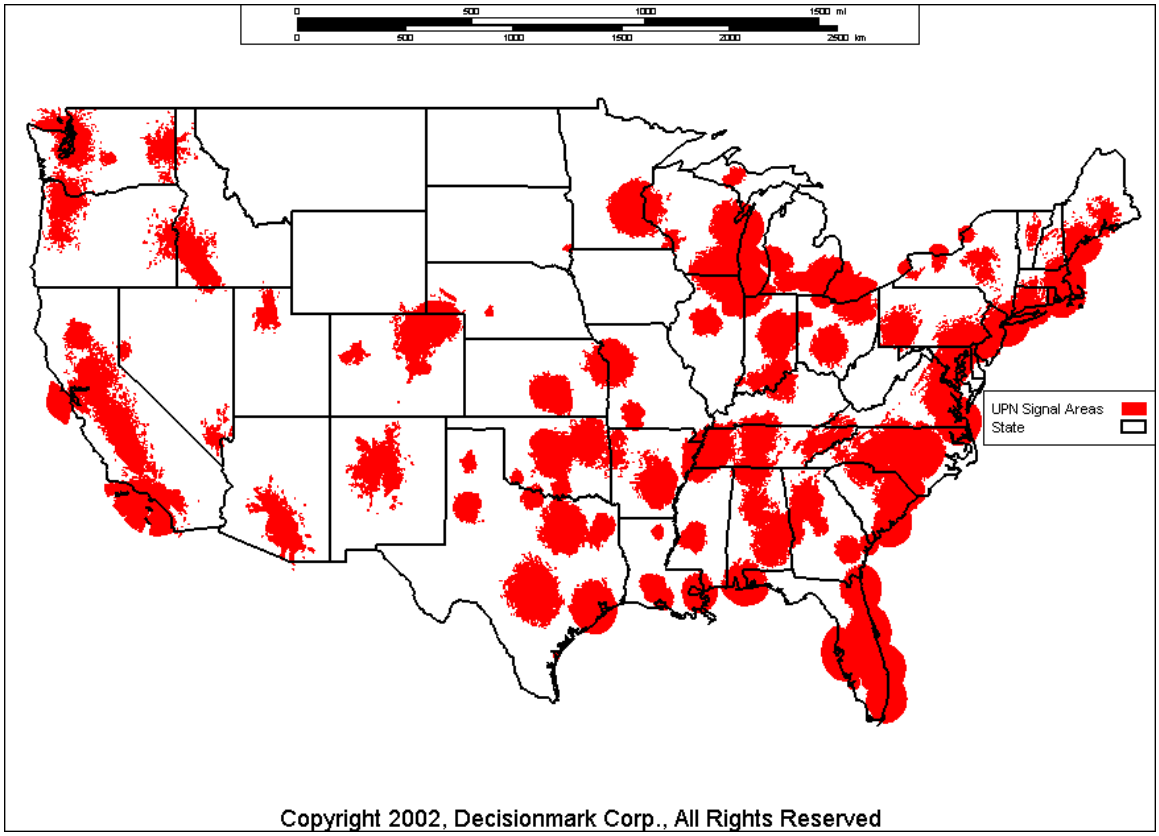
National Coverage for PBS
Translators Only



Served/Unserved HHs for PBS (Translators Only)

Network	2000 Served Households	2000 Unserved Households	Total
PBS	6,718,381	98,761,720	105,480,101

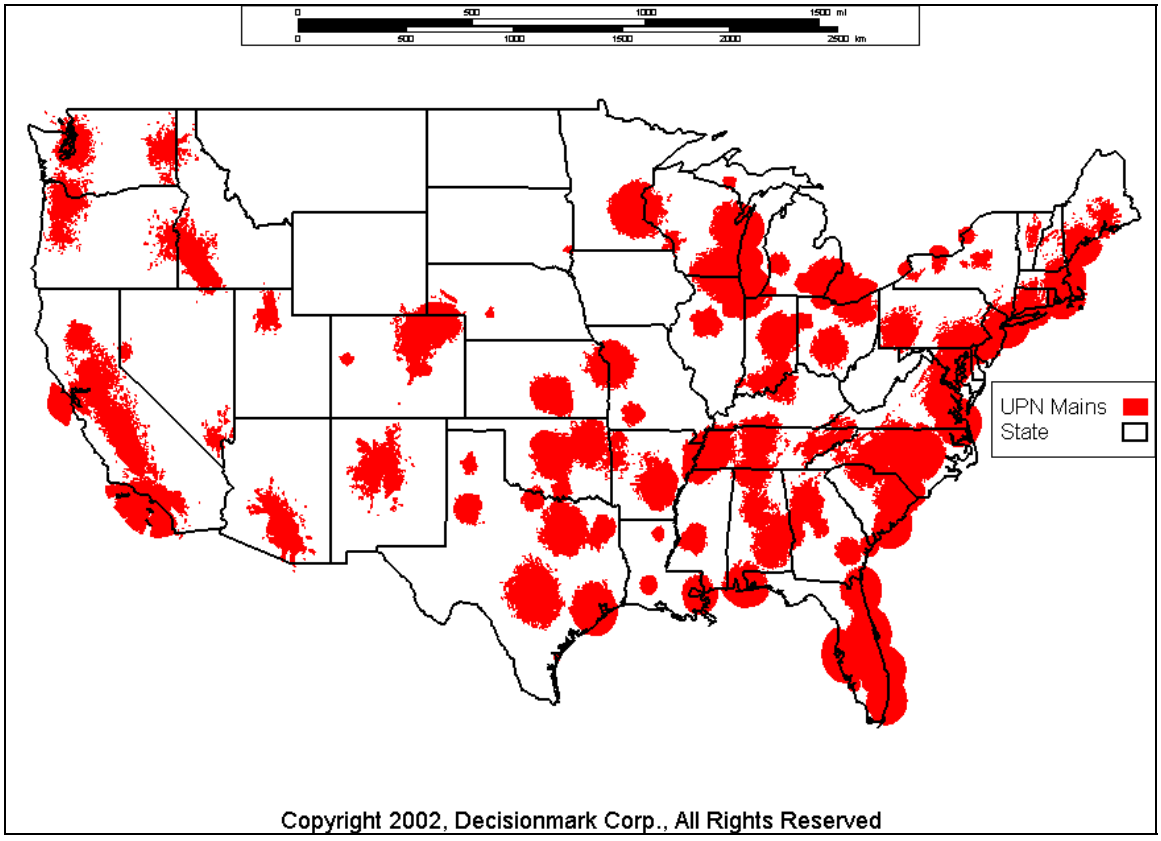
National Coverage for UPN
Mains and Translators



Served/Unserved HHs for UPN

Network	2000 Served Households	2000 Unserved Households	Total
UPN	71,280,660	34,199,441	105,480,101

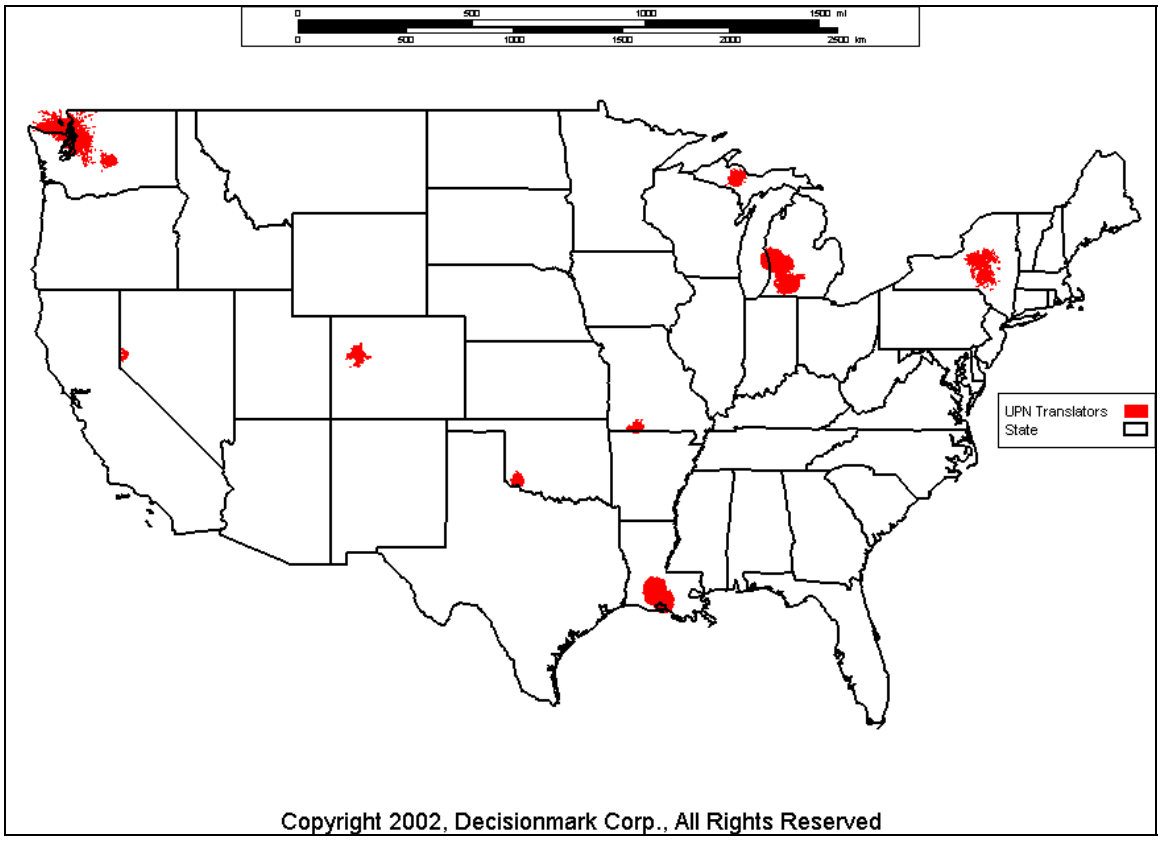
National Coverage for UPN
Mains Only



Served/Unserved HHs for UPN (Mains Only)

Network	2000 Served Households	2000 Unserved Households	Total
UPN	70,691,088	34,789,013	105,480,101

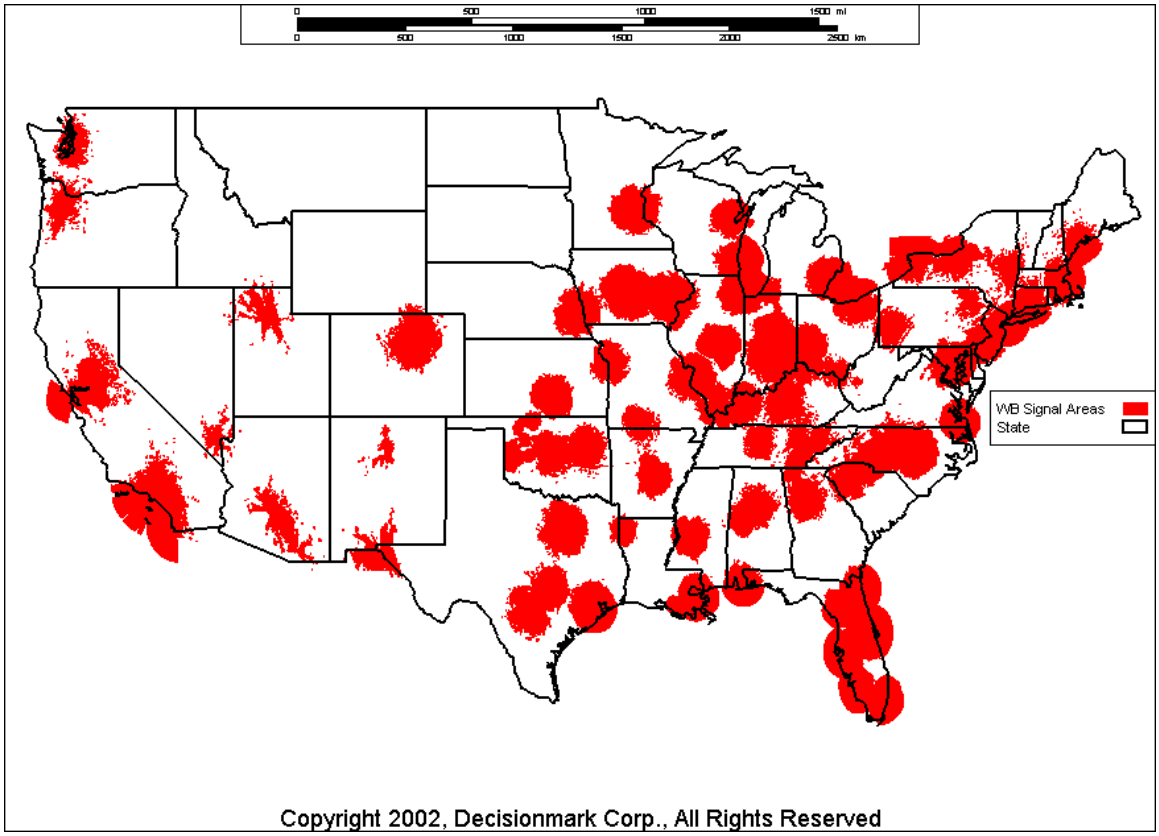
National Coverage for UPN
Translators Only



Served/Unserved HHs for UPN (Translators Only)

Network	2000 Served Households	2000 Unserved Households	Total
UPN	1,320,128	104,159,973	105,480,101

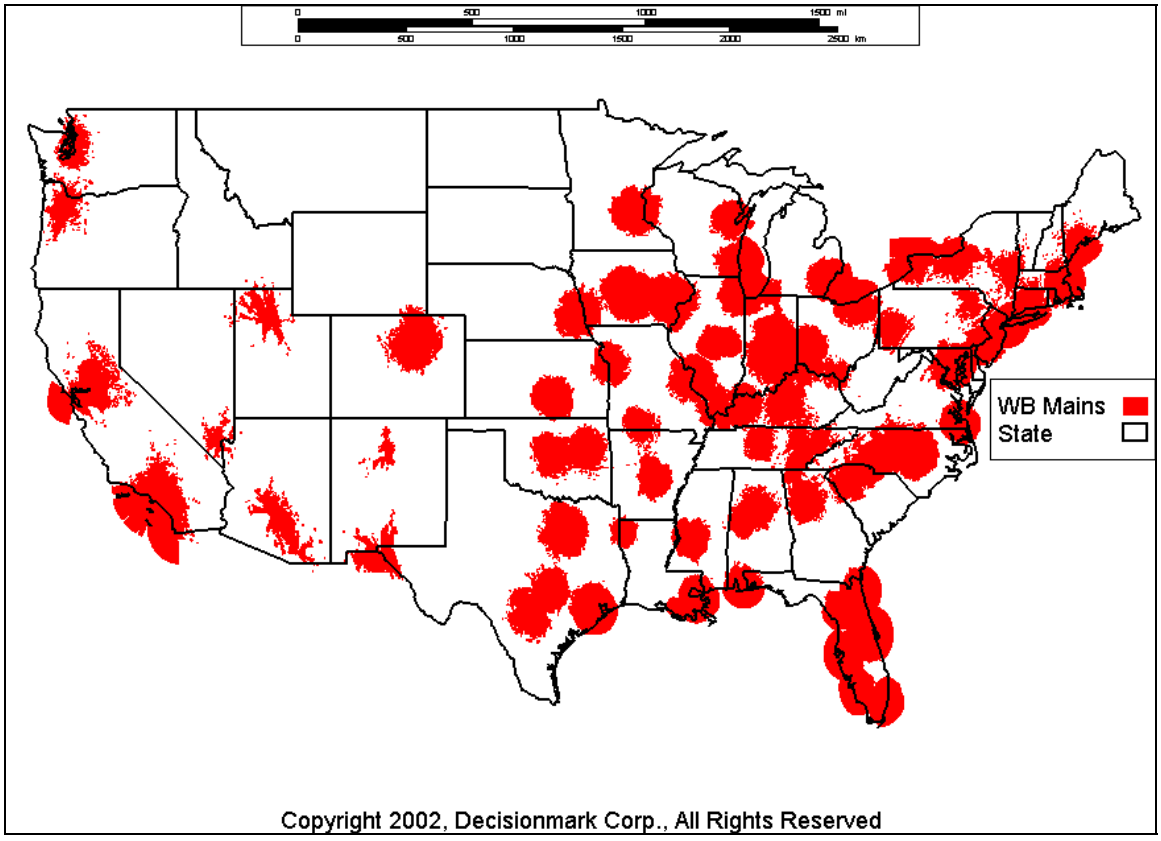
National Coverage for WB
Mains and Translators



Served/Unserved HHs for WB

Network	2000 Served Households	2000 Unserved Households	Total
WB	70,740,882	34,739,219	105,480,101

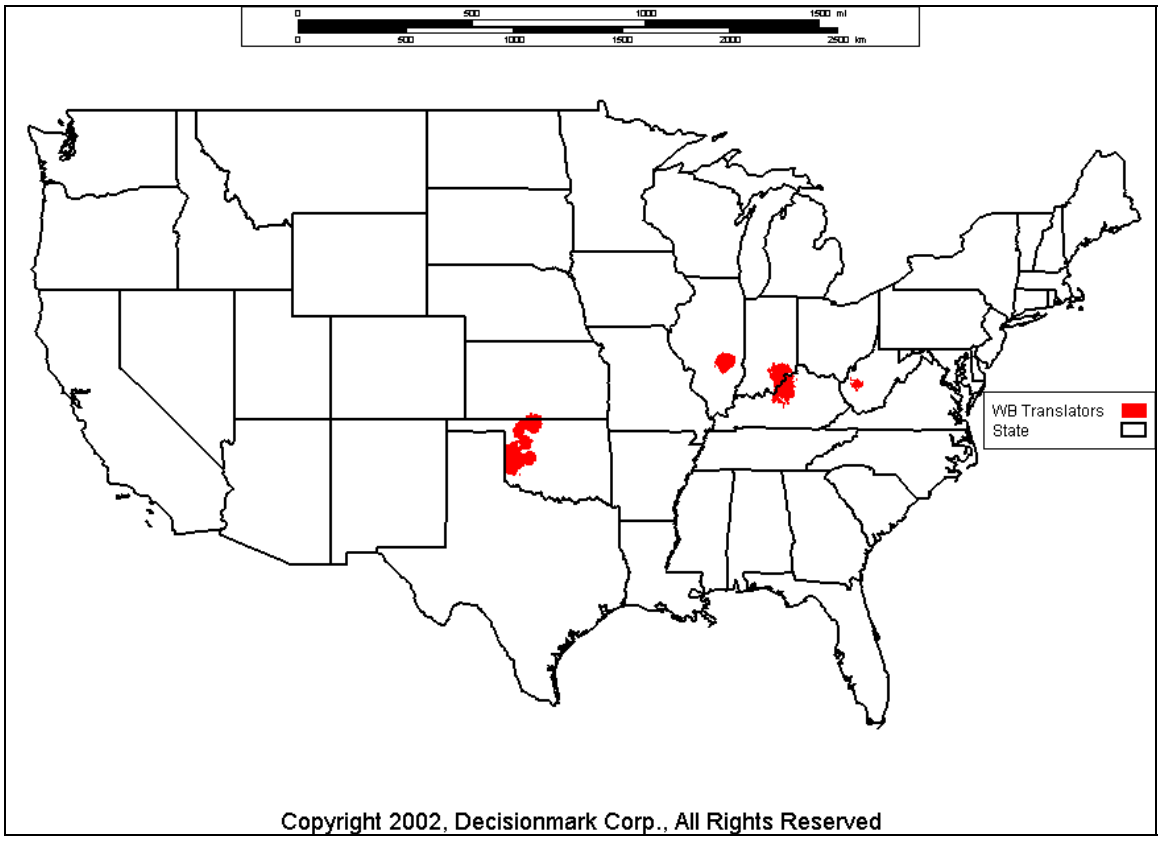
National Coverage for WB
Mains Only



Served/Unserved HHs for WB (Mains Only)

Network	2000 Served Households	2000 Unserved Households	Total
WB	70,542,157	34,937,944	105,480,101

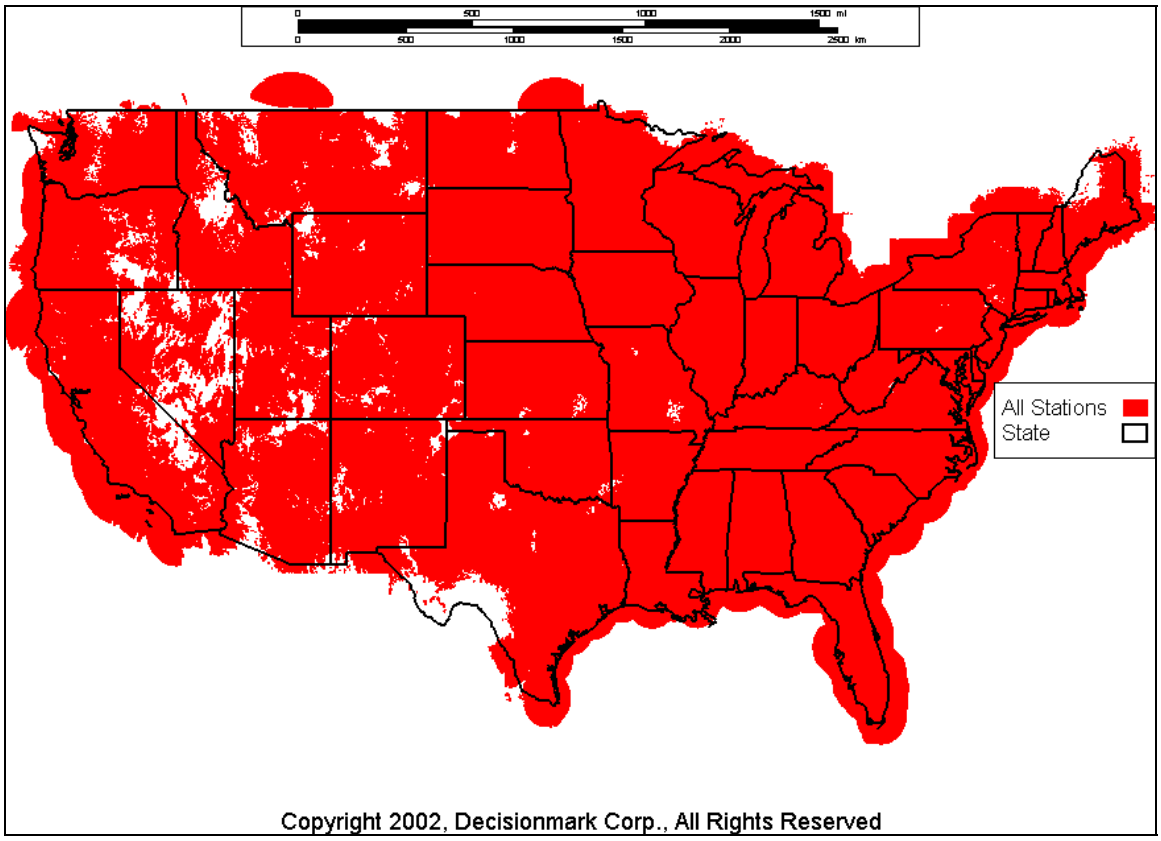
National Coverage for WB
Translators Only



Served/Unserved HHs for WB (Translators Only)

Network	2000 Served Households	2000 Unserved Households	Total
WB	769,621	104,710,480	105,480,101

National Coverage for All 7 Networks
Mains and Translators



Households That Can/Cannot Receive all 7 Networks

Network	2000 HHs Can Receive All 7	2000 HHs Cannot Receive All 7	Total
All	58,587,112	46,892,989	105,480,101
